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(72) Inventors GUNTER WEINZIERL
REINER FIEBIG
WOLFGANG GURTNER



(54) AN ELECTRICAL SWITCH FOR HIGH VOLTAGES

(71) We, INSTITUT "PRUFFELD FÜR ELEKTRISCHE HOCHLEISTUNGSTECHNIK", a corporation organised under the laws of Eastern Germany, of 38a Landsberger Chaussee, Berlin-Lichtenberg, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to an electrical switch for switching high voltages.

According to the present invention there is provided an electrical switch including a housing defining a hermetically sealed chamber therein, at least first and second fixed switch contact electrodes having their contact parts positioned within the chamber, the first electrode projecting through the housing and being insulated therefrom, the second electrode being mounted only internally of the chamber, an elongate movable switch contact electrode engageable with the first or second electrodes being longitudinally movable from outside the chamber and a terminal member fixed relative to the housing on the outside thereof, the terminal member being electrically interconnected with the second of the fixed contact electrodes, wherein the movable electrode is movable between a closed position in which it engages the first fixed contact electrode, an open position and another position in which it engages the second fixed contact electrode.

One form of switch construction may be provided in which the second fixed switch contact electrode consists of one contact electrode connected conductively to the earth terminal via the housing and arranged in the path of movement of the movable switch contact electrode which is led through an aperture or hole in the second electrode.

An alternative form of switch may include a third fixed contact projecting through and insulated from the housing, the movable contact electrode bridging the first and third contact electrodes, and a fourth fixed switch contact electrode in the path of the movable electrode, the fourth electrode being mounted

on and electrically connected with the first fixed contact electrode while the second electrode is mounted on the housing at one side thereof, whereby the first and third and second and fourth electrodes respectively are bridged by the movable bridging contact.

The second switch contact electrode of each of these switches serves as a fixed earth switch contact electrode. The switch connection to earth or the housing occurs by a movement of the movable electrode beyond the interrupting position or voltage isolating position of the movable switch contact electrode. The contact faces of the switch electrodes consists of material with a minimum weld tendency, preferably steel, or are provided with a coating of such materials. Suitable as hermetically sealed switch chambers are evacuated chambers or chambers with a sulphur hexafluoride (SF₆) filling. Metering elements for current and voltage can be accommodated in the switch chamber in a known manner.

An advantageous feature of the invention consists in that two or more sets of switch contacts can be provided, connected in parallel inside one switch chamber. Alternatively two or more sets of switch contacts can be provided connected in series, inside one switch chamber.

The switch according to the invention possesses numerous advantages over known switches. The integration of the switch functions, interconnecting, interrupting, voltage isolating and earthing in one switch chamber with high insulation properties and the smallest insulation distances makes possible the realisation of all the occurring switch operations in the smallest space and at minimum cost. The invention creates a fast-operable earth switch, and an interconnecting switch, without additional drive, since one and the same drive is used for the earthing as well as the other switching.

Two constructional forms of the invention will now be described by way of example, with reference to the accompanying drawing, in which:

Figure 1 is a longitudinal section of an

electrical switch with two fixed and one movable switch contact.

Figure 2 is a longitudinal section of an electrical switch with four fixed contacts and one movable contact which is arranged as a bridging contact.

Referring now to Figure 1 there is shown an electrical switch having an evacuated chamber defined by a cylindrically shaped metal housing 1 which is provided with insulating end plates 2, 3 at each end thereof one of which plates carries a fixed switch contact 4 and the other of which serves as a guide for a movable switch contact 5. The switch contacts 4, 5 and are so arranged that their contact parts lie opposite each other and are relatively movable and separable in the switch chamber or enclosure. When engaged with one another the contacts serve to interconnect a load with a source of supply voltage and to break such interconnection as soon as the movable switch contact 5 moves into the disengaged or switched-off position of the switch contacts. In use of the switch the metal housing 1 is earthed by means of an earth terminal 6. A screen 7 is fixedly mounted by means of an insulating member onto the metal housing 1 in the region of the contact parts of switch contacts 4, 5.

To effect sealing of the switch chamber where the movable switch contact 5 passes through the end plate 3 a bellows arrangement 8 is arranged between the end plate and the shaft of the movable switch contact. An earthing contact 9 is arranged inside the switch chamber in the path of the movable contact 5 and is conductively connected to the metal housing 1 which in use of the switch is earthed. Earthing of the switch occurs by a further movement of the movable contact 5 beyond the open position or voltage isolating position so that a special drive for this operation is obviated.

The embodiment shown in Figure 2 differs from the first in that there are two fixed switch contacts 14 led through metal housing 10 via insulating inserts 12, 13, and one movable bridging contact 15 engageable with the contacts 14. The rod carrying the bridging contact 15 consists of insulating material. The bridging contact 15 also serves to bridge two further switch contacts 19. One of these contacts 19 is mounted on contact 14 and is electrically connected therewith, while the other contact 19 is mounted on the metal housing 10 and is electrically connected with the housing and the earth terminal 6.

In Figure 2 those elements which are common to the embodiment described with reference to Figure 1 bear the same reference numerals and are not described further.

WHAT WE CLAIM IS:—

1. An electrical switch including a hous-

ing defining a hermetically sealed chamber therein, at least first and second fixed switch contact electrodes having their contact parts positioned within the chamber, the first electrode projecting through the housing and being insulated therefrom, the second electrode being mounted only internally of the chamber, a movable elongate switch contact electrode engageable with the first or second electrodes being longitudinally movable from outside the chamber and a terminal member fixed relative to the housing on the outside thereof, the terminal member being electrically interconnected with the second of the fixed contact electrodes, wherein the movable electrode is movable between a closed position in which it engages the first fixed contact electrode, an open position and another position in which it engages the second fixed contact electrode.

2. A switch as claimed in claim 1, wherein the first fixed contact electrode is fixedly mounted in an insulating part of the housing and wherein the second fixed contact electrode is mounted on an electrically conductive part of the housing and is provided with an aperture therein for receiving the movable contact.

3. A switch as claimed in claim 2, including an insulating guide member through which the movable contact projects, the second fixed contact electrode extending across the chamber.

4. A switch as claimed in claim 1, including a third fixed contact projecting through and insulating from the housing, the movable contact electrode bridging the first and third contact electrodes, and a fourth fixed switch contact electrode in the path of the movable electrode, the fourth electrode being mounted on and electrically connected with the first fixed contact electrode while the second electrode is mounted on the housing at one side thereof, whereby the first and third and second and fourth electrodes respectively are bridged by the movable bridging contact.

5. A switch as claimed in any one of the preceding claims, wherein the switch contact electrodes are formed from steel or a material coated with steel.

6. A switch as claimed in any of the preceding claims, wherein there is a vacuum within the sealed chamber.

7. A switch as claimed in any of claims 1 to 5, wherein the chamber is filled with sulphur hexafluoride SF_6 .

8. A switch as claimed in any one of the preceding claims, including two or more sets of switch contact electrodes connected in parallel in a single switch chamber.

9. A switch as claimed in any one of claims 1 to 7, including two or more sets of switch contact electrodes connected in series in a single switch chamber.

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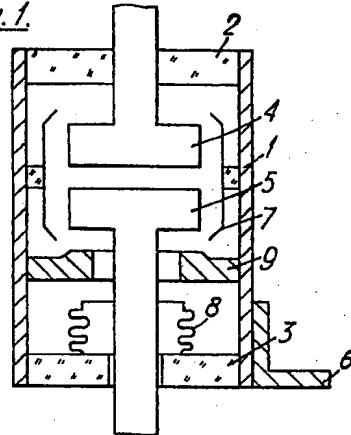
10. A switch device substantially as here-
inbefore described with reference to, and as
illustrated in, Figure 1 or Figure 2 of the
accompanying drawing.

For the Applicants,
MATTHEWS, HADDAN & Co.,
Chartered Patent Agents,
Haddan House,
33 Elmfield Road,
Bromley, Kent, BR1 1SU.

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Fig. 1.*Fig. 2.*